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Medical progress

Evolution of medical education in ancient Greece

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The study of ancient Greece is essential for the proper understanding of the evolution of modern Western medicine. An important innovation of classical Greek medicine was the development of a body of medical theory associated with natural philosophy, i.e. a strong secular tradition of free enquiry, or what would now be called "science" (Επιστήμη). Medical education rests upon the ancient Greek foundations and its history remains a fascinating topic for modern physicians and medical teachers.

As Drabkin so eloquently noted half a century ago: "the history of medical education will show how lasting was the influence of the ancient system of medicine, not only in its substantive contributions, but in its devotion to reason, in its attitude toward the relation between science and the medical art, in its concept of disease and classification of diseases, in its ethical attitudes and standards and in countless other ways".[1]

MEDICAL EDUCATION THROUGH "MAGIC" AND "RELIGION"

In prehistoric times, magic and religion were a fundamental part of the healing practice. Therefore, the first primitive medical practitioners were witch doctors or sorcerers. Through a gradual process that lasted for centuries, superstition and religion were replaced by rational inquiry and explanation. At its beginnings, ancient Greek medicine was undoubtedly influenced by neighbouring regions such as Babylonia and Egypt or even more distant civilizations such as India and China.[2] As medical practice was tied to magic and religion, so too was medical education symbolized in myth. Thus, the first Greek medical teacher was probably Chiron (Χίρων), the human-horse mythological figure. According to Homer, Chiron taught Asclepius the secrets of the drugs that relieve pain and stop bleeding. Chiron was so famous in his era that the sons of many noble families, including Jason (Ιάσονας), Achilles (Αχιλλέας) and other Homeric heroes, became his apprentices and lived with him during early adolescence studying philosophy and the sciences, including medical arts. Among his teachings the "techni" (τέχνη) (art) of caring for the ill and injured was included.[3]

Asclepius (Ασκληπιός) was the God of Medicine in Ancient Greece and he was worshiped in hundreds of temples (Asclepions) throughout Greece. The remains of such shrines may still be seen at Epidaurus (Επίδαυρος), Cos (Κώς), Athens (Αθήνα), and elsewhere. Asclepions (Ασκληπιεία) were founded at the 6th century B.C. and served as mysticistic centers of medical education for selected "godly blessed" priests. Patients visiting these sacred sanctuaries were treated by a healing ritual known as incubation, or temple sleep. They slept overnight in the dormitory, or abaton (άβατο), and were visited in their dreams by Asclepius and his daughters Hygeia and Panacea or by one of his priests, who gave them divine advice and inspiration. They reported their dreams to a priest the next morning. The pilgrims were either spontaneously healed or the priest prescribed a cure based on their dream. Evidently, the temple healers relied largely on the use of psychological methods, i.e. suggestion through the use of charms, rituals and incantations, but they also employed physical means, some if which were genuinely efficient. Thus, the temple patients were also offered hydrotherapy and enjoyed theatre, music, poetry and a good diet.

It must be emphasized that the temple physicians of Asclepions differed from lay medical practitioners and there is no evidence that they acted as tutors to lay physicians. Patients who visited the Asclepions and treated by the ritual therapeutics were usually cases that were given up as incurable by lay medicine.[4] Asclepius' legacy was bequeathed by his sons and students Podaleirius (Ποδαλίρειος) (Internist) and Machaon (Μαχαόν) (Military surgeon) who also appeared in the homeric epics (8th century B.C.). It is notable how the passing of medical knowledge from generation to generation in Ancient Greece is so characteristically reflected in the Asclepius' family. Even Aclepius' father, Apollo, was originally considered the God of Medicine before inheriting his mantle to his sons.

With the passage of time, the influence of superstition and religion on medicine steadily decreased until the boundary of rationality and magic was demarcated by the arrival of Hippocrates' rational medicine.[5] However, it appears that, despite the occasional competitive bouts between these different types of healers, the Asclepian

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temple physicians generally existed side by side, in uneasy proximity, throughout the centuries with the Hippocratics until the formers' practice was eventually perceived as a pagan rite and thus rejected by early Christianity.

MEDICAL "CRAFTSMEN" AND THE MENTORING OF MEDICINE IN ANCIENT GREECE

The division between medicine as a "science" and medicine as an "art" is an ancient one. The ancient Greeks frequently contrasted the non-scientific practitioner to the theoretically grounded physician/ philosopher. According to Plato, a medical apprenticeship that was based only on observation and experience was routine and impersonal in comparison to those physicians who strived to make the understanding of nature fundamental to their art and teaching.[6] It appears that the majority of medical practitioners did not concern themselves with biological theories and philosophy. However, the few that did care about the nature of health and the underlying anatomic and physiological changes behind a particular disease, were considered the leaders of their profession.[5]

Greek doctors usually practiced privately but were occasionally employed by a city-state as public health officers who treated citizens without charge. These state-salaried physicians were supported by a special tax called "iatrikon" (Ιατρικόν) and sometimes received additional benefits including tax reductions, free pass to recreational centres and statues erected in their honour. Such state participation in citizen health care is evidenced throughout antiquity and began as early as the 6th century B.C. However, no evidence exists that these civic physicians were involved in medical education or that special taxes like the "iatrikon" were used to finance public medical education.

Various texts from the Hippocratic Collection help us understand Greek medical practice during the antiquity. A surprisingly large part of medical practice of that period seems to reflect the physician's insecure position. Thus, a good diagnostician aimed to impress the patient and win his confidence. The practice of prognosis was also an important proof of competence and a valuable psychological tool in gaining the patients' trust. On the other hand, physicians tended to decline cases that were obviously incurable in order to avoid any loss of reputation. To ensure that physicians would not amass too much wealth, they were advised to adjust their fees to each patient's means and, when necessary, treat them without payment. While some doctors were permanent residents in a particular city, a large number travelled from place to place searching for a living in response to the demand for doctors and seeking to possess intimate knowledge of the ailments peculiar to each region.[5]

No system of formal medical education or any curriculum program that issued diplomas to successful medical students existed in the classical antiquity. Even the first centres of medical excellence such as Cos and Cnidos and, later on, the museum of Alexandria (Αλεξάνδρια) did not provide any legally recognized certification or formal system of teaching. On the other hand, physicians who were associated with one of the major medical schools were probably more in demand compared to their less prestigiously educated peers.

The passing on of knowledge through mentoring was highly regarded in the Greek antiquity from as early as Homer's (Όμηρος) time.[7] Accordingly, medical knowledge was bequeathed from father to son or to the physician's assistant via a master-apprentice relationship: the apprentice learned by observing and assisting his master curing patients.[8] Such medical education was fundamentally practical. The student learned to take detailed medical history from the patient, his relatives or friends, catalogue observable regularities, and accordingly formulate rational hypotheses, explanations and treatments. He was trained to properly use his senses of observation, hearing, smelling, palpating and carefully examine the patient's pains, mental state, position in bed, fever, breathing , and excretions (urine, feces and sweats). The patient's pulse was also examined but its profound diagnostic significance was not elaboratively catalogued at these times. Practical experience was an essential component of the medical craft taught to the apprentice. As was noted in the Hippocratic texts: "He who aspires to practice surgery must go to war". A competent student would also attend the patient as a nurse in serious cases. Good students would complement such practical work with the study of books (e.g. the Hippocratic Collection, Dioskorides' book of herbals and drug preparation) in order to combine knowledge with experience and obtain self confidence and autonomy. The quality of training depended on the master's skills and the student's prowess. The length of education depended on the depth of the apprentice's studies and on his intellectual skills and competence.[1] In theory, medical training was open to every man. Of course, the aspiring physician required a master willing to train him and the successful medical protégée required certain characteristics, including above-average intelligence and a firm grasp of reality. But in principle, the pursuit of medical knowledge in ancient Greece was unrestrained.

Evidently, medical practice retained a very "free market" approach throughout the ancient world. The Babylonians characteristically presented their sick at the market place in search of those persons who could advise and/or treat the disease. In line with this attitude, no legally recognized method existed to prevent amateur and inadequately trained physicians or various kinds of quacks from practicing in Greek antiquity. One established himself as a doctor not by presenting his training certifications but by vigorously defending the reputation he acquired in practice and by carefully

cultivating the confidence of his clients. The physicians' fierce competition with other healers, his conscience, and the patient's demands for efficacy were his only restrictions and incentives for self-improvement. The only possible evidence of completed medical training and qualification may have been the Hippocratic Oath, as well as attendance to one of the major medical schools.

It may be strange that the ancient Greek civilization, with all its sophistication, failed to establish any means of protection from ignorant and potentially dangerous physicians. But one needs to remember the distinct features of ancient Greece that could explain why this system persisted and even how it could work adequately for so many centuries. The Greek region was literally fragmented into hundreds of independent city-states and this hindered any possible attempt of a unified professional evaluation policy. Therefore the ancients had to rely on the self-policing apprentice system by which Greek medical education was organized. Each of the masters, who were successful and experienced physicians, would take care in recruiting, selecting and training their apprentices and carefully monitor their progress to ensure the quality of their education, which was important to reputation of the master as well as the student.

THE ROOTS OF RATIONAL MEDICINE

First medical schools

The first medical schools were founded in Greece and in the Southern Italy (Magna Grecia) regions of Sicily and Calabria. In the classical antiquity, medical "schools" were essentially schools of thought formed by an influential medical practitioner and his followers. There were no academic buildings dedicated to medical training. The "school" was essentially realized wherever its adherents would gather. With the coming of the 5th century B.C. the most famous of such centers were Cos, where Hippocrates (Ιπποκράτης) was born, and Cnidus, situated just opposite of Cos on Asia Minor. These ancient Greek states developed medical schools that served as hallmarks of medical education. The doctors associated with these schools shared knowledge and certain medical practices; medical students retained a master-apprentice relation with their teachers and observed their masters treating diseases and prescribing measures such as good diet, exercise, and herbal remedies. Aspiring surgeons were trained as assistants to a military surgeon accompanying troops on a campaign. The instruction was of course very informal and there was no established certificate of the student's right to practice.[1]

Hippocratic medicine

Hippocrates was born in about 460 B.C. on the island on Cos, an island of the coast of Asia Minor in the Dodecanese (Δωδεκάνησα), where he developed his immensely influential rational school bringing about the transition from empiricism to scientific medicine in antiquity. During his lifetime, Hippocrates was undoubtedly the most renowned physician and teacher of medicine. Soranus stated that Hippocrates traced his descent and medical knowledge from his father Heraclidos (Ηράκλειδος) and Asclepius. He practiced medicine in his birthplace of Cos but also ventured in other parts of Greece including Athens, Sicily, Alexandria, Cyrine and Cyprus; he died in Thessaly at an advanced age in about 377 B.C. Although Hippocrates is widely considered the father of medicine and well-known scribes such as Plato and Aristotle have documented a number his achievements, there is little knowledge about his actual life and biography. There is even a possibility that Hippocrates was actually not one but many men of the same name.[9] Whether Hippocrates was one man or several, the works attributed to him mark the stage in Greek medicine where physicians were encouraged to offer rational explanations concerning the cause and character of disease and health, instead of superstition and magic. Hippocrates' rational medicine was notably based on common sense and substituted divine intervention in favour of a profound, practical philosophy. Hippocrates is thought to have originated the concept of the "four humours" (plegm, yellow bile, black bile and blood) in medical physiology. The humoural doctrine stated that good health was the result of the harmonious equilibrium and blending of the four humours. Thus, disease was explained as the consequence of humoural imbalance. Relative excess of each humour resulted in particular personality types. An abundance of blood, yellow bile, black bile or phlegm was respectively associated with the sanguine, phlegmatic, choleric and melancholic temperaments. Hippocratic medicine notably emphasized maximum conservation in all medical treatments according to the famous Hippocratic motto: "to help or at least to do no harm". Hippocrates put more emphasis on diet and recommended a restricted use of drugs, which is to be expected if one considers that the rational medical use of herbs required a thorough systemization of the botanical world that would only be achieved a century after Hippocrates' death by Theophrastus (Θεόφραστος). Hippocrates also knew well how to describe a disease clearly and concisely and recorded treatment outcomes, both failures as well as successes.[9] He also introduced the first concepts of medical ethics contained in the Hippocratic oath which still serves as the ethical nucleus of today's physicians.[10] Hippocratic medicine gave emphasis on the patient rather than the disease and concentrated on experience and on the visual aspect of observation rather than theory. On the other hand, Cos' rival school, Cnidus, focused on a reductionist conception of disease, similar to the modern approach. However, Hippocrates' school achieved more wealth and recognition because it focused on the patient, while the school of Cnidus concentrated on studying the disease in the absence of the necessary technical instruments and general scientific infrastructure that could carry out its ideas the School of Cnidus ceased to exist, whereas that of Hippocrates flourished. The conflicting philosophies of medical education and the

different interpretations of the nature of medicine (medicine as science versus medicine as art) raged on for several centuries until the unifying influence of Galen's (Γαληνός) (129-200 A.D.). Theories and research became the standard system that was passed on to later ages all the way to the 16th century.

Medical education through the Hippocratic collection

It is possible that Hippocrates was the author of only some, or even none, of the texts that comprise the Hippocratic Collection (Corpus Hippocraticum), a compilation of over 70 medical treatises that are traditionally attributed to him. Hippocrates' students and his two sons, Thessalus and Draco, were the successors of the Hippocratic tradition and a large part of the Hippocratic Collection, including the Oath, was written by them. The Hippocratic tradition became the accepted standard for medical education and these texts were taught in universities throughout most of the ancient West and during the Renaissance until the 19th century. The Hippocratic collection contained a series of aphorisms, among which is the well-known "Life is brief, art is long, opportunity is fleeting, experience is fallacious, judgement is difficult" (often shortened to the Latin tag, "Ars longa, vita brevis"). These passages are the foundation of Hippocrates' philosophy and lay much stress to careful, repetitious thought before a medical intervention. Such aphorisms are followed by case histories, summary accounts of the climatic conditions, brief comments on diseases, symptoms and prognostic indications, many of which remain valid.[9]

Post-Hippocratic era

In the following century the work of Aristotle (Αριστοτέλης), regarded as the first great biologist, incalculably influenced medicine. Aristotle was a student of Plato at Athens and tutor to Alexander the Great (Μέγας Αλέξανδρος). His interests and studies included the entire world of living things. He was the founder of comparative anatomy and embryology and his work influenced scientific and medical thinking for the next 2 millennia.[5]

Following Aristotle's time, the centre of Greek culture shifted to the Egyptian city of Alexandria. The famous medical school of Alexandria was established in about 300 BC and replaced Cos and Cnidos as the foremost centre of medical excellence. Its two founders and best medical teachers were Herophilus (Ερόφιλος), who is known as the first anatomist in history, and Erasistratus (Ερασίστρατος), whom some regard as the founder of physiology. Medical studies at this great school were based on a more professional tutorship by its renowned teachers supplemented by practical apprenticeship under one of these physicians. Thus, the earlier periods' master-apprentice relationship was gradually replaced by that of professor-student. Due to this notable change in the character of medical education, large numbers of students were tutored by fewer professors. This university atmosphere did not in itself preclude clinical instruction and bedside teaching. It did however introduce a new non-professional direction for medical education in the sense that some students studied biology and medicine not for the purposes of professional practice but as part of scientific and philosophic exploration. This division of studies probably depended on each student's social status, with the more wealthy protégées generally preferring to focus on an academic approach to medicine. There were also certain individuals who studied almost every possible subject matter (polymaths). Such an endeavour to encompass all knowledge would have been incompatible with a busy medical practice. The tripartite division of medical education can be seen from as early as Aristotle's time described as "the physician who is a craftsman, the scientific physician, and the man who has studied medicine as part of his education".[1] The museum of Alexandria continued as a centre of medical teaching even after the Roman Empire had attained supremacy over the Greek world.

The medical education of women

Women in Greek antiquity avoided examination and treatment from male physicians, a fact that often hindered successful treatment. This should not come as a surprise considering that ancient Greek women were taught from a young age to be ashamed of their bodies. Before the 5th century B.C. childbirth was almost exclusively entrusted to female kin and neighbours who had themselves given birth. Some of these women stood out because of their skills and became known by the title of "maia" (Μαία) or "midwife". Most midwife practitioners were usually trained from other midwives. The story of Agnodice (Αγνοδίκη), who according to myth was the first female to achieve the role of physician despite this being forbidden by law, has been cited by many Western midwives during the Renaissance in an attempt to medicalize childbirth. It seems that there were women in ancient Greece who studied medicine serving alongside leading male physicians and practiced obstetrics and gynaecology. As of yet there are few data regarding the involvement of women in general medical practice other than gynaecology.[1,5,11]

CONCLUSION

Medical education in ancient Greece closely mirroring the evolution of ancient Greek though originates from magic and religion which is gradually superseded by more objective and careful practices leading to the Hippocratic rational medicine that coincided with the Golden Century of Pericles (Περικλής). Certain aspects of ancient medical education such as the market-based reputation system of medical education and practice may be fascinatingly peculiar today. But on these ancient times we can also trace the fundamental concepts that continue to guide modern practice. In a world that was initially dominated by superstition, the first great medical schools advocated a more thorough, objective, ethical

practice to their students and these principles were reiterated and embellished by the today's medicine. More than two millennia later, we feel obliged to decrypt the roots of our modern medical education.

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